

Modeling the Cosmic Large Scale Structure with LEFTfield

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A new wave of data is arriving from surveys of the Cosmic Large Scale Structure over the present and coming decade. Analyzing this data, however, imposes considerable challenges. Firstly, one requires accurate theoretical modeling with the ability to marginalize robustly over any theory uncertainties, such as the connection between the galaxy density and the underlying dark matter distribution. Secondly, it is unclear how the comparison between model and data can be performed optimally. State of the art analyses use n-point correlation functions, however, these cannot extract all information available on scales beyond the strictly linear regime. In this talk, I will introduce the LEFTfield code, which allows to forward-model the structure formation history in the survey volume. By using an Effective Field Theory description for galaxy bias, astrophysical uncertainties can be modeled rigorously. As one example, I will show recent developments that incorporate the computation of the velocity field, allowing to study redshift space distortions at a high precision.